

Hutton's Arse: 3 billion years of extraordinary geology in Scotland's Northern Highlands (second edition) by Malcolm Rider and Peter Harrison, Dunedin Academic Press, Edinburgh (2019), x+226 pp., Pbk., ISBN: 9781780460406. £19.99

The British Isles are almost unrivalled in their diversity of geology and northern Scotland is arguably the richest of all. With a long history of training generations of earth science students, the region is increasingly a draw for geotourists, both witting and unwitting - many driving the much-publicised "North Coast 500" route. Inspired by this rich resource comes a welcome reappearance of a popular book, updated with new science that builds on two centuries of discovery.

Hutton's Arse (3 billion years of extraordinary geology in Scotland's Northern Highlands) first saw the light of day in 2005, a labour of love for its author, Malcolm Rider. Straight away, I have to admit to never having read the book – notwithstanding a long history of working and visiting the area, and having built a fair collection of writings on its geology. The title just didn't sell the contents – even when browsing bookshops on wet days in Wester Ross. The name is strange – alluding to the soreness of nether-regions experienced by the titular "father of geology" when conducting fieldwork on obligatory horseback. Hutton never ventured to the northern Highlands – indeed it made for a difficult expedition in his lifetime. The earliest geological visits, including Macculloch's somewhat cursory investigations through to Murchison, Nicol, Geikie and Miller in the mid 19th century, all came after Hutton's death. But other people have clearly been more curious than I – *Hutton's Arse* saw four reprints. And now it comes back, in a revamped second edition with Malcolm Rider sharing writing credits with Peter Harrison: there is now an explicit tie-in to the NW Highlands Geopark. The rocks and landscapes of northern Scotland are used as entry points to discuss great issues in the earth sciences. The accounts are fairly wide-ranging so readers are taken around the World – and to Mars – as the stories unfold.

The book opens with the Torridonian – vividly recreating the red desert world of the Mesoproterozoic. The interpretation of the Stac Fada rocks as part of an ejecta blanket from a meteor impact, albeit along with the implausible crater site beneath Lairg, is one of the new story elements to feature in this second edition. The outcrops motivate discussions of the snowball Earth hypothesis and its impact on the evolution of life on Earth. Next up

comes the Moine Thrust Belt and the tale of the Highlands Controversy. The story is always worth recounting – as is the importance of Peach, Horne and colleagues in mapping the thrust belt. This is well-trodden ground, both metaphorically and literally (in the case of Knockan Crag) although readers may still come away wondering what all the fuss was about. For the scientific, rather than socio-philosophical, significance, it's worth checking the papers in the volumes edited by Law et al. (2010) and Betterton *et al.* (2019).

From the NW coastal beginnings, Rider and Harrison next take the reader to Caithness and the remarkable Devonian fossil fish localities of the Old Red Sandstone. Hugh Miller takes centre stage initially but the authors lead us into discussions on palaeontology, stratigraphy and their role in illuminating evolution. Then it's back to the west and a visit to Rum's igneous geology, within the Lochaber Geopark. The authors use this to examine volcanic processes and the opening of the Atlantic.

The authors then step into a modern controversy, at least in their eyes, concerning climate change. The landscapes of the northern Highlands clearly evidence the comings and goings of ice over the past couple of million years – indeed this completely dominates the bedrock geology. They point out evidence, increasingly recognised, that the great thaw at the end of the last stadial was exceptionally rapid, generating catastrophic flooding recorded by deep-cut gorges and boulder-strewn valley floors. The conclusion, that there has been rapid, non-anthropogenic climate change in the past, is written to suggest humankind shouldn't worry about the rapid global warming of the world today. This might be seen as somewhat complacent, even smug, by some visitors who live in parts of the world experiencing rather more dramatic environmental impacts than the inhabitants of Scotland.

The final meaty chapter uses the Lewisian as an entry into the formation of continents. And so, the book turns full-circle, looking at the early Earth (although the oldest rocks in Scotland are still younger by nearly three times the duration of the Phanerozoic than the formation of the planet). This leads into the concluding, quasi-philosophic discourse on the place of planet Earth in the cosmos, and an exercise in comparative planetology (Earth vs Mars). Somewhat strangely, it appears somewhat dated in comparison with other chapters, given the amount of geological knowledge gained through NASA's deployment of the Curiosity rover and other missions since the first edition of *Hutton's Arse*.

Rider and Harrison conclude each chapter with short publication lists, some field guides and other broadly accessible accounts, along with curiously-selected research papers. These lists are somewhat patchy – I'd recommend that devotees track down the books published by the Joint Nature Conservation Committee on sites in the Geological Conservation Review. Mendum *et al.* (2009) cover the Lewisian, Torridonian and Moine Thrust aspects, Rum is in the volume on the British Tertiary Igneous Province (Emeleus & Gyopari 1992), the Old Red Sandstone volume (Barclay *et al.* 2005) includes Caithness and fossil fish localities feature in Dineley & Metcalf's (1999) tome. Gordon & Sutherland (1993) cover much of the glacial landscape evolution. They are not cheap and are prone to technical language (though perhaps less than the recommended BGS memoirs) but hard copy should be available in "all good libraries". There is also a suite of relevant Special Publications of the Geological Society (e.g. Law *et al.* 2010; Betterton *et al.* 2019) that can bring some of the science up to date.

Hutton's Arse is nicely illustrated, though some photographs would have benefitted from larger format. It could also have used some rigorous copy-editing: there are quite a few typos and other grammatical glitches, including sporadic lapses into singular first-person pronouns, inherited from the single-authored first edition. There are errors and omissions also in the referencing – which can be especially frustrating for those readers who are curious to find out more. But overall these are small quibbles. Hutton's Arse is a rumbustious account of geology, geologists, landscapes and controversies all written with passion and a certain quirkiness. These are personal stories with the authors guiding readers on adventures in the countryside, describing how landscape reveals clues of past geological activity and how this knowledge can illuminate broader scientific questions. Some of the heroes (and villains) of Victorian earth science are introduced along the way. This second edition improves on the first and will surely sell well, certainly to the visitors taking refuge from the weather, midges and the queues of motorhomes on the A 838.

References

Barclay, W.J., Browne, M.A.E., McMillan, A.A., Pickett, E.A., Stone, P. and Wilby, P.R., 2005. The Old Red Sandstone of Great Britain. *Geological Conservation Review Series*, Vol. 31. Joint Nature Conservation Committee. Peterborough. 393 pp.

Betterton, J., Craig, J., Mendum, J.R., Neller, R. and Tanner, J. 2019. Aspects of the Life and Works of Archibald Geikie. *Geological Society, London, Special Publications*, **480**, 406 pp.

Dineley, D.L. and Metcalf, S.J., 1999. Fossil fishes of Great Britain. *Geological Conservation Review Series*, Vol. 16. Joint Nature Conservation Committee. Peterborough. 675 pp.

Gordon, J.E. and Sutherland, D.G., 1993. Quaternary of Scotland. *Geological Conservation Review Series*, Vol. 31. Joint Nature Conservation Committee. Peterborough. 695 pp.

Emeleus, C.H. and Gyopari, M.C., 1992. British Tertiary Igneous Province. *Geological Conservation Review Series*, Vol 4. Joint Nature Conservation Committee. Peterborough. 279 pp.

Law, R.D., Butler, R.W.H., Holdsworth, R.E., Krabbendam M. & Strachan, R. 2010. Continental Tectonics and Mountain Building. The Legacy of Peach and Horne. *Special Publications of the Geological Society of London*, **335**, 872 pp.

Mendum, J. R, Barber, A. J., Butler, R. W. H., Flinn, D., Goodenough, K. M., Krabbendam, M., Park, R. G. and Stewart, A. D. 2009. Lewisian, Torridonian and Moine rocks of Scotland *Geological Conservation Review Series*, Vol. 34, Joint Nature Conservation Committee, Peterborough, 721 pp.

Rob Butler

*Geology & Geophysics, School of Geosciences, University of Aberdeen, Aberdeen AB24 3UE,
UK.*

Orchid: 0000-0002-7732-9686

E-mail address: rob.butler@abdn.ac.uk

***Declaration of Interest Statement**

There are no interests to declare with respect to this book review.

A handwritten signature in black ink, appearing to read "Z. B. Butte", followed by a horizontal line.

January 2020.